



Steam Ship: In-situ Repair of Corroded Tubes



Problem: A steam freighter – sailing the Pacific corridor - had experienced aggressive pitting and through wall corrosion of its condenser tubes, affecting operating efficiency and reliability. The condenser was located in the bowels of the ship, effectively below the water line. Many factors were considered as the project scope was developed, working within a limited maintenance schedule without adversely affecting commercial transport was among the priorities.

Consultation: Curran International evaluated sample tubes pulled from the condenser and found spherical cavities containing crystalline chlorides, calcium and sulphides. Substantial pit fields were found surrounding multiple through-wall pits in one of the specimen tubes. Further evaluation was performed of the scaled areas, and active corrosion cells were found where scale was partially removed.

Solution: Working within the limited schedule of the freighter port dates, Curran International developed a project scope to clean existing scale and corrosion, and coat the full length 20' condenser tube IDs. All aspects of coating were to be performed in-situ; containment during surface preparation and forced curing of the epoxy material were considered in advance of crew deployment.

Tube IDs and tubesheets were abrasive blasted clean to SSPC-SP5; all trace contaminants were removed from full length IDs and tubesheets prior to coating. A proprietary method was used to coat full length tubes with a thin film of epoxy, forcing the material into pitted cavities and sealing tubes. The duration from the project start to final cure was less than 9 days.

Results: When returned to service the ship's engineer reported a 25% improvement in "overboard" sea temperature ΔT , and an improvement in vacuum was realized. After a 12-day crossing it was noted "...the main condenser is tight....The boiler chlorides have not gone up at all...This will save us \$\$\$ in the long run."